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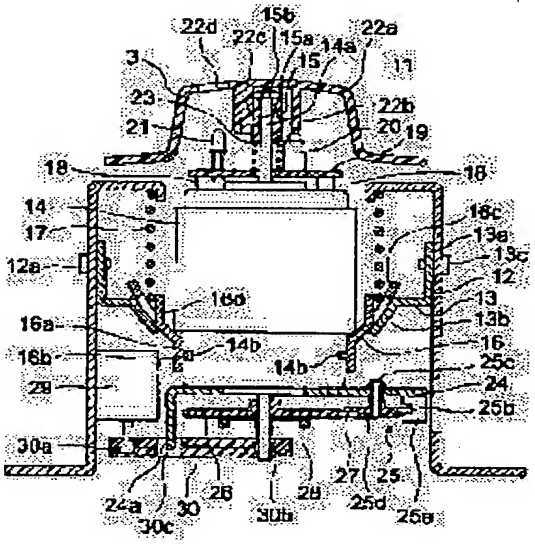
(71)Applicant : ALPS ELECTRIC CO LTD
(72)Inventor : ONODERA MIKIO

(54) MANUAL INPUT DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an on-vehicle input device superior in operability which gives a manual operation part a proper resistance corresponding to operation contents through being small-sized.
SOLUTION: A manual input device 1 is comprised of an actuator 14 freely shakably attached to a frame 12, a manual operation part 3 which attached to a driving shaft 14a of the actuator 14, a first position sensor 29 which detects the direction and the extent of shake of the actuator 14, a second position sensor 25 which detects the direction and the extent of rotation of the driving shaft of the actuator 14, and a control part which takes position signals outputted from first and second position sensors as inputs to control the actuator and loads the manual operation part 3 with an external force corresponding to the operation.



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CLAIMS

[Claim(s)]

[Claim 1] The manual input unit characterized by providing the following. The actuator attached in the frame free [rocking] The manual operation section attached in the driving shaft of the actuator concerned The 1st position sensor which detects the rocking direction and the amount of rocking of the aforementioned actuator the [the 2nd position sensor which detects the hand of cut and rotation of a driving shaft of the aforementioned actuator, and / the above 1st and] -- the control section which inputs each position signal outputted from 2 position sensors, controls the aforementioned actuator, and carries out the load of the external force according to the operation to the aforementioned manual operation section

[Claim 2] The manual input unit according to claim 1 characterized by the aforementioned actuator being a rotary motor.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the manual input unit which operates intensively the various electronic equipment mounted, for example in the one manual operation section, and relates to the manual input unit which formed into 1 motor the actuator which carries out the load of the external force to the manual operation section especially.

[0002]

[Description of the Prior Art] Although the automobile in recent years is equipped with various kinds of electronic equipment, such as an air-conditioner, radio, television, a CD player, and a navigation system, when it is going to operate such much electronic equipment individually with the operation means with which each was equipped, there is a possibility of causing trouble to an automobilism. Then, in order to enable it to perform easily an on-off change, a selection of function, etc. of desired electronic equipment, without barring a safety operation, the manual input unit whose various operations of various kinds of electronic equipment are conventionally attained by operating the one manual operation section is proposed.

[0003] The conventional technology of this manual input unit is explained referring to drawing 11 - drawing 14. The inside view of the automobile which drawing 11 shows the example of installation of a manual input unit; the side elevation of a manual input unit with which the conventional proposal of drawing 12 is made, the plan of the manual operation section of the manual input unit which shows drawing 13 to drawing 12 , and drawing 14 are the plans of the guide plate included in the manual input unit shown in drawing 12 .

[0004] As shown in drawing 11 , the manual input unit 100 of this example is installed in the console box 200 prepared between the automobilism seat and the passenger seat. And the conventional manual input unit 100 shown in drawing 12 The manual operation section 110 (refer to drawing 13) equipped with two switches 111,112 for a click, and three rotated type variable resistors 113,114,115 as a signal input means, X-Y table 120 driven to the 2-way (the direction which intersects perpendicularly with the space of drawing 12 , and longitudinal direction of illustration) which intersects perpendicularly mutually by this manual operation section 110, The stick controller 130 as a position sensor which inputs the signal according to the direction of operation and the amount of operation of this X-Y table 120 into an external instrument, It is mainly constituted by the engagement pin 160 which protruded on the inferior surface of tongue of X-Y table 120, and the guide plate 140 (refer to drawing 14) which has an engagement relation.

[0005] The manual operation section 110 and X-Y table 120 are unified through the connecting shaft 150, and X-Y table 120 and the guide plate 140 are being engaged by inserting the point of the engagement pin 160 in the guide slot 141 of a guide plate 140 possible [movement]. Although this guide slot 141 can be set as the arbitrary configurations which are moved in the specific direction and deal in the point of the engagement pin 160, as shown, for example in drawing 14 , a flat-surface configuration can engrave the guide slot 141 on the cross on the upper surface of a guide plate 140, and the point of the engagement pin 160 can be moved to each edge of B, C, D, and E along with the 2-way which carries out an abbreviation rectangular cross from Center A. That is, by operating the manual operation section 110, the engagement pin 160 can be moved along the guide slot 141 of a guide plate 140 through X-Y table 120, and the information (position signal) about the engagement position is outputted from the stick controller 130 in the state where the point of this engagement pin 160 was located in the every

place points A, B, C, D, and E in the guide slot 141. So, the function (function which it is going to adjust) set as the operation object of the electronic equipment currently mounted can be alternatively chosen using this position signal. And if a desired function of electronic equipment is chosen in this way, the selected adjustment and selected change of a function can be performed by operating suitably two click switches 111,112 and three rotated type variable resistors 113-115 which are formed in the manual operation section 110.

[0006] Thus, as shown in drawing 11 , the manual input unit 100 constituted is combined with control sections, such as the display 180 which displays the switching equipment 170 which chooses desired electronic equipment alternatively out of two or more electronic equipment currently mounted, the contents operated by the name and the manual input unit 100 of electronic equipment which were chosen with this switching equipment 170, and a computer which controls each of these equipments and which is not illustrated, and can operate now two or more electronic equipment intensively. In addition, switching equipment 170 is installed in the console box 200, and the operation switches 171a-171e are arranged near the manual input unit 100, and are connected with the electronic equipment by which these operation switches 171a-171e differ, respectively according to the individual. For example, supposing each operation switches 171a-171e are connected according to the mounted air-conditioner, radio, television, the CD player, the navigation system, and the individual, respectively Air-conditioner mode to an on-off change and manual input unit 100 of an air-conditioner can be specified by operating operation switch 171a. Radio mode to an on-off change and manual input unit 100 of radio can be specified by operating operation switch 171b. Similarly, mode specification to the on-off change and manual input unit 100 of electronic equipment which correspond, respectively can be performed by operating other operation keys 171c-171e. Moreover, the display 180, such as a liquid crystal display, is installed in the legible place from the driver's seat, and the aforementioned computer is installed in the console box 200.

[0007] Although the selection of function and functional adjustment of electronic equipment which were chosen with switching equipment 170 can be performed by operating a manual input unit 100, according to the kind of selected electronic equipment, a selectable function differs from the function which can be adjusted by operation of a manual input unit 100. For example, when switching equipment 170 is operated and it is specified as air-conditioner mode, Although the function of "air-capacity adjustment" will be chosen if the manual operation section 110 is operated, the engagement pin 160 is located in the edge B of the guide slot 141 of a guide plate 140 and the click switch 111 is pushed in and clicked If the engagement pin 160 is located in the edge C of the guide slot 141 and the click switch 111 is clicked, the function of "adjustment of a blowdown position [a style]" will be chosen. If similarly the engagement pin 160 is located in the edges D and E of the guide slot 141 and the click switch 111 is clicked, the function of "adjustment of the direction [a style] of the blowdown" and a "temperature control" will be chosen, respectively.

[0008] And after choosing these functions, the function can be adjusted by operating suitably the rotated type variable resistors 113-115. For example, the air capacity of an air-conditioner can be adjusted by operating the rotated type variable resistor 113, when air-conditioner mode is specified with switching equipment 170 and "air-capacity adjustment" is chosen by the click switch 111, and when "adjustment of a blowdown position [a style]" is similarly chosen in air-conditioner mode, the blowdown position of the wind of an air-conditioner can be adjusted by operating the rotated type variable resistor 114,115. Moreover, when volume of radio can be adjusted by operating the rotated type variable resistor 113 when radio mode is specified with switching equipment 170 and "volume control" is chosen by the click switch 111 and "tuning" is similarly chosen in radio mode, radio can be tuned up by operating the rotated type variable resistor 114,115.

[0009]

[Problem(s) to be Solved by the Invention] However, since it was not able to know which function of which electronic equipment is chosen now, therefore was easy to produce the operation mistake of the manual operation section 110, the manual input unit 100 concerning the conventional example was not necessarily able to be called what has good operability.

[0010] the place which this invention is made in order to cancel the defect of this conventional technology, and is made into the technical problem is to offer the input unit for mount excellent in the operability which can make it small and can ensure operation which is a request

[0011]

[Means for Solving the Problem] The actuator which was able to attach the manual input unit in the frame free [rocking] since this invention solved the aforementioned technical problem, The manual operation section attached in the driving shaft of the actuator concerned, and the 1st position sensor which detects the rocking direction and the amount of rocking of the aforementioned actuator, the [the 2nd position sensor which detects the hand of cut and rotation of a driving shaft of the aforementioned actuator, and / the above 1st and] -- each position signal outputted from 2 position sensors was inputted, the aforementioned actuator was controlled, and it considered as the composition containing the control section which carries out the load of the external force according to the operation to the aforementioned manual operation section

[0012] A rotary motor can be used as the aforementioned actuator. In this case, the load of the external force which vibrates to the circumference of the driving shaft of the rotary motor concerned can be carried out to the manual operation section.

[0013] While according to this composition attaching an actuator in a frame free [rocking] and detecting the rocking direction and the amount of rocking of the actuator concerned in the 1st position sensor Since the hand of cut and rotation of a driving shaft of the actuator concerned are detected in the 2nd position sensor For example, by being made to perform functional adjustment of the mounted electrical machinery and apparatus which chose the mounted electrical machinery and apparatus which is going to carry out functional adjustment by switching the rocking direction of an actuator, and was chosen according to the rotation of a driving shaft Selection and functional adjustment of a request of a mounted electrical machinery and apparatus

can be performed in the one manual operation section. Moreover, since the manual operation section is attached in the driving shaft of an actuator and it was made to carry out the load of the external force according to the operation to the manual operation section A user can be notified of the content of operation of the manual operation section by blind touch. a user Since the manual operation section can know sensuously whether it is operated at the rate of the request of only the control input of a request in the direction of desired, the operation mistake of the manual operation section is prevented and operability of a manual input unit can be made good. Moreover, according to this composition, since the manual operation section was attached in the driving shaft of an actuator, the power transmission device which connects the manual operation section and a driving shaft becomes unnecessary, and a miniaturization and lightweight-izing of a manual input unit can be attained. Furthermore, according to this composition, since it has only one actuator, a miniaturization and lightweight-izing of a manual input unit can be attained also from this point.

[0014]

[Embodiments of the Invention] Hereafter, the example of 1 operation gestalt of the manual input unit concerning this invention is explained, referring to a drawing.

[0015] The perspective diagram showing the installation state to the dashboard of the manual input unit which drawing 1 requires for this example of an operation gestalt, and drawing 2 are the plans showing the indoor state of an automobile where the manual input unit concerning this example of an operation gestalt was attached.

[0016] The manual input unit 1 concerning this example of an operation gestalt so that clearly from drawing 1 The case 2 is formed in the shape of [of a necessary size] a square shape container. in the upper surface of the case 2 concerned Six push button switches 4a, 4b, 4c, 4d, 4e, and 4f consisting mainly of the manual operation section 3 and the setting section of the manual operation section 3 concerned arranged circularly, This, three push button switches 5a, 5b, and 5c arranged in the shape of a concentric circle, and volume tongues 6 are arranged by the periphery portion of the array position of the six push button switch groups concerned. Moreover, in the front face of the case 2 concerned, the card slot 7 and the disk slot 8 are established. As shown in drawing 2 , this manual input unit is attached between the driver's seat B of the dashboard A of an automobile, and a passenger seat C, has two incomes with the computer (control section) which was contained in the display D with which Dashboard A was equipped, and Dashboard A and which is not illustrated, and can demonstrate a necessary function now.

[0017] A total of nine above-mentioned push button switches 4a, 4b, 4c, 4d, 4e, and 4f, and 5a, 5b and 5c are individually connected with the mounted electrical machinery and apparatus which it is going to operate using a manual input unit 1, for example, an air-conditioner, radio, television, a CD player, a car-navigation system, etc. Although it can be set up arbitrarily which push button switch and which mounted electrical machinery and apparatus are connected In the manual input unit 1 of this example push button switch 4a Menu selection, Air-conditioner and push button switch 4d A car-navigation system, [push button switch 4b] [telephone and push button switch 4c] Radio and push button switch 4f The reader writer or disk drive equipment of a card, [push button switch 4e] The on-off control of the liquid crystal shutter with which the attitude control of the input unit 1 for mount and push button switch 5b were prepared for push button switch 5a all over Display D, Push button switch 5c is connected to television, respectively, and the mounted electrical machinery and apparatus connected to the push button switch concerned can be chosen now by pushing in the knob of a desired push button switch. In order to prevent an operation mistake, a character, a pictorial symbol, etc. which show each mounted electrical machinery and apparatus to which each switch was connected are displayed on the front face of the knob of each push button switch (illustration ellipsis).

[0018] Next, the composition of the mechanism section equipped with the manual operation section 3 is explained based on drawing 3 or drawing 5 . The guide plate by which the mechanism section is equipped with the cross section of the mechanism section with which drawing 3 contains the manual operation section, and drawing 4 and the plan for the periphery, and drawing 5 are the plans showing an example of the connection structure of the main shaft of an actuator and the code board axis of rotation with which the mechanism section is equipped.

[0019] The frame 12 by which the mechanism section 11 was formed in approximate circle tubed so that clearly from drawing 3 , The actuator receptacle 13 prepared in the inside of the frame 12 concerned, and an actuator 14, The slider 15 attached in driving shaft 14a of the actuator 14 concerned, The bracket 16 which attaches the aforementioned actuator 14 in the aforementioned actuator receptacle 13 at a rockable, it was set up between brackets 16 and the aforementioned frames 12 concerned -- with a member 17 the 1st spring The printed circuit board 19 attached in the upper surface of the aforementioned actuator 14 through the boss 18, The switch 20 and lamp 21 which were connected to the printed circuit board 19 concerned, The manual operation section 3 attached in driving shaft 14a of the aforementioned actuator 14, the manual operation section 3 concerned is always energized upward to the aforementioned actuator 14 -- with a member 23 the 2nd spring The encoder tie-down plate 24 attached in the inferior surface of tongue of the aforementioned actuator 14, The encoder 25 attached in the encoder tie-down plate 24 concerned (the 2nd position sensor), The pulley 26 attached in driving shaft 14a of the aforementioned actuator 14, The belt 27 which connects a pulley 26 and the driving shaft of the aforementioned encoder 25 concerned, The guide plate 28 which was attached in the inside of the aforementioned frame 12 and has been arranged under the aforementioned actuator 14, It mainly consists of coupling rods 30 which connect the stick controller (the 1st position sensor) 29 attached in the inside of the aforementioned frame 12, the stick controller 29 concerned, and driving shaft 14a of the aforementioned actuator 14.

[0020] The actuator receptacle 13 consists of fixed part 13a of the cylindrical shape which has the diameter which can be attached in the inside of a frame 12, and receptacle section 13b formed in the shape of the spherical surface, places spherical-surface-like receptacle section 13b upside down, and fixed part 13a ****s it to the inside of a frame 12, and it

is fixed by 13c.

[0021] When a rotary motor is used for an actuator 14, the external force of the circumference of the driving shaft concerned can be given to the manual operation section 3 through driving shaft 14a.

[0022] The slider 15 is formed in the shape of [which has the diameter which can be attached in the superficies of the aforementioned driving shaft 14a] a cylinder, and engagement slot 15a for attaching in one the manual operation section 3 explained in detail later is formed in the part. It is regulated by screw head 15of screw thread with which it is always energized upward by member 23 2nd spring, and upper limit of moving range of slider 15 concerned was screwed in point of driving shaft 14a by which slider 15 concerned was stretched between printed circuit boards 19 b.

[0023] A bracket 16 is one piece or plurality (in the example of drawing 3) which protruded on the inside of fixed part 16a of the cylindrical shape which has the diameter which can be attached in the superficies of an actuator 14, and the fixed part 16a concerned. Two snap presser-foot-stitch-tongue 16b, the aforementioned receptacle section 13b, and sliding section 16c formed in the shape of [of abbreviation same curvature] the spherical surface, It consists of 16d of the spring receptacle sections started from the sliding section 16c concerned. It is attached in an actuator 14 by strong-fitting the lower part of an actuator 14 into fixed part 16a, and engaging snap presser-foot-stitch-tongue 16b with snap slot 14b formed in the lower superficies of an actuator 14. The actuator 14 with which the bracket 16 was attached is attached in a frame 12 by laying sliding section 16c in the aforementioned actuator receptacle 13, and stretching a member 17 the 1st spring between 16d of spring receptacle sections, and spring receptacle section 12b formed in the frame 12. Therefore, if an actuator 14 can be rocked in the arbitrary directions to a frame 12 and the operating physical force is removed, it will return to a vertical position automatically by the elastic force of a member 17 the 1st spring.

[0024] This soma 22a in which the manual operation section 3 was formed in the shape of [of an operational size] a cap with the finger, Approximate circle tubed switch control unit 22b installed downward from the center-section inferior surface of tongue of this soma 22a concerned, It consists of 22d of the illumination sections formed in stop presser-foot-stitch-tongue 22c formed in the inside of the switch control unit 22b concerned, and a part of this aforementioned soma 22a, and unites with a slider 15 by engaging with engagement slot 15a formed in the aforementioned slider 15 in stop presser-foot-stitch-tongue 22c. Of course, in this case, the attaching position of the manual operation section 3 to a slider 15 is adjusted so that the point of switch control unit 22b may counter with the switch 20 arranged on a printed circuit board 19 and it may counter with the lamp 21 with which 22d of illumination sections has been arranged on a printed circuit board 19.

[0025] An encoder 25 consists of carrier light-emitting-device 25a, code board 25b formed in disc-like, axis-of-rotation 25c supported possible [rotation of the code board 25b concerned], and pulley 25d which fixed to the axis-of-rotation 25c concerned. Between pulley 25d and the pulley 26 attached in driving shaft 14a of the aforementioned actuator 14, as shown in drawing 5 ; a belt 27 winds almost and is carried out, and the position signal according to the hand of cut and rotation of driving shaft 14a is outputted from carrier light-emitting-device 25a. In addition, although illustration is omitted, the tensioner for holding tension uniformly can also be engaged with the aforementioned belt 27.

[0026] A guide plate 28 is for regulating the operation direction and control input of the manual operation section 3, and as shown in drawing 3 , it regulates the operation direction and control input of the manual operation section 3 by penetrating driving shaft 14a of an actuator 14 to guide slot 28a established by the guide plate 28 concerned. Drawing 4 is drawing showing an example of guide slot 28a formed in a guide plate 28, and if it is in this example, guide slot 28a is formed in the radial prolonged in the eight directions from a center position P1. In addition, the signs P2, P3, and P4 in drawing, P5, and P6, P7, P8 and P9 show the position of the end of each guide slot 28a.

[0027] The stick controller 29 outputs the position signal according to the rocking direction and the amount of rocking of driving shaft 14a. The position signal outputted from the position signal outputted from the aforementioned encoder 25 and the stick controller 29 concerned is incorporated by the mounted computer which is not illustrated, and control of the aforementioned actuator is presented with it.

[0028] a coupling rod 30 -- driving shaft 29a of the stick controller 29 and driving shaft 14a of an actuator 14, and ball joint 30a -- it 30b minds, and it is connected and the movement of driving shaft 14a is transmitted to driving shaft 29a In addition, sliding guide 30c is established by this coupling rod 30, point 24a of the encoder tie-down plate 24 is inserted in the sliding guide 30c concerned, and the baffle of a coupling rod 30 is planned.

[0029] In this composition, if the manual operation section 3 is operated in the direction parallel to a guide plate 28, the operating physical force will be transmitted to a bracket 16 through an actuator 14, slipping will be produced between receptacle section 13b of the actuator receptacle 13, and sliding section 16c of a bracket 16, and an actuator 14 will rock. Since it has penetrated to guide slot 28a of the radial by which driving shaft 14a of an actuator 14 was established by the guide plate 28 at this time, an actuator 14 is alternatively rocked only in each change position P2-P9 direction from the center position P1 of guide slot 28a.

[0030] Thus, if an actuator 14 rocks, driving shaft 14a will rock to it and one, the movement will be transmitted to driving shaft 29a of the stick controller 29 through a coupling rod 30, and the position signal corresponding to the rocking direction and the amount of rocking of driving shaft 29a will be outputted from the stick controller 29. This position signal is incorporated by the computer which is not illustrated and selection of a desired electrical machinery and apparatus is performed by the computer concerned. when the operating physical force applied to the manual operation section 3 was removed from this state, the actuator 14 was adjusted between the frame 12 and the bracket 16 -- it returns to a vertical position automatically by the elastic force of a member 17 the 1st spring

[0031] Moreover, if rotation operation of the manual operation section 3 is carried out around driving shaft 14a, the turning effort will be transmitted to code board 25b through driving shaft 14a, pulley 26, belt 27, and pulley 25d, code board 25b will rotate to the hand of cut of the manual operation section 3, and the position signal corresponding to the hand of cut and rotation of the manual operation section 3 will be outputted from carrier light-emitting-device 25a of an encoder 25. This position signal is also incorporated by the computer which is not illustrated and functional adjustment of the electrical machinery and apparatus previously chosen by computer concerned and motion control of an actuator 14 are performed. The control method of an actuator 14 based on the position signal outputted from an encoder 25 is also explained later.

[0032] Furthermore, if the manual operation section 3 is pressed to the shaft orientations of driving shaft 14a, the slider 15 connected with the manual operation section 3 and this, and one will resist and descend to the elastic force of a member 23 the 2nd spring. And switch control unit 22b formed in the manual operation section 3 presses the switch 20 arranged on a printed circuit board 19, and a switch signal is outputted from a switch 20. This switch signal is also incorporated by the computer which is not illustrated and decision of the electrical machinery and apparatus chosen by computer concerned and a function is made. if the operating physical force applied to the manual operation section 3 after switch press is removed -- the manual operation section 3 -- the above -- it returns to a upper-limit position automatically by the elastic force of a member 23 the 2nd spring

[0033] Hereafter, the control method of an actuator 14 based on the position signal outputted from an encoder 25 is explained based on drawing 6 or drawing 10 . Explanatory drawing which illustrates the classification of the mounted electrical machinery and apparatus as which drawing 6 is chosen by the operation direction of the manual operation section 3 and it, explanatory drawing which illustrates the function in which drawing 7 is adjusted by rotation operation and it of the manual operation section 3, the block diagram in which drawing 8 shows the control system of an actuator 14, the graphical representation which illustrates the mode of external force in which the load of drawing 9 is carried out to the manual operation section 3, and drawing 10 are flow charts which show the control procedure of an actuator 14.

[0034] The manual input unit 1 of this example can choose now radio, an air-conditioner, a car-navigation system, a CD player, television, a surveillance camera, an E-mail, and a telephone, respectively by operating the manual operation section 3 in each direction of the left rear, the left, and the forward left the forward right, the right, the right rear, and the back a front [position / center], as shown in drawing 6 (a) and (b). In addition, classification of the electrical machinery and apparatus chosen by operating the classification and the manual operation section 3 concerned of the electrical machinery and apparatus chosen by the push button switches 4a, 4b, 4c, 4d, 4e, and 4f with which the manual input unit 1 was equipped, and 5a, 5b and 5c can also be made into the combination of an electrical machinery and apparatus of the same kind, and also let it be the combination of an electrical machinery and apparatus of a different kind. In this example of an operation gestalt, classification of the electrical machinery and apparatus chosen by operating the classification and the manual operation section 3 of an electrical machinery and apparatus which are chosen by the push button switches 4a-4f, and 5a-5c is made into the combination of an electrical machinery and apparatus of a different kind.

[0035] Moreover, the manual input unit 1 of this example can adjust the function of the selected electrical machinery and apparatus concerned by operating the manual operation section 3, after choosing the electrical machinery and apparatus of 1. For example, when a channel selection of a radio station is chosen by operating the manual operation section 3, as shown in drawing 7 (a), the channel selection of a desired broadcasting station is attained by carrying out rotation operation of the manual operation section 3. Moreover, when the temperature control of an air-conditioner is chosen by operating the manual operation section 3, as shown in drawing 7 (b), elevation or descent of an air-conditioner of setting temperature is attained by carrying out rotation operation of the manual operation section 3.

[0036] The control system of an actuator 14 has composition shown in drawing 8 , and the manual input unit 1 concerning this example of an operation gestalt can add now the external force illustrated to drawing 9 to the manual operation section 3 by controlling an actuator 14 by the procedure shown in drawing 10 according to operation of the manual operation section 3.

[0037] namely, the patterns 45a, 45b, and 45c which encoded the drive conditions (an output value or output mode) of the actuator 14 according to the operation field and each operation field of the manual operation section 3 to ROM44 with which the computer concerned was equipped while the actuator control system of this example formed the collating section 42 and the pattern selection section 43 in CPU41 with which the computer in Dashboard A was equipped, as shown in drawing 8 ... is memorized Moreover, Display D is equipped with the position signal detecting element 46 which displays operation tracing of the manual operation section 3, while downloading the signal from the stick controller 29 to the aforementioned computer and outputting the pattern selection signal according to the operation field of the manual operation section 3 to the aforementioned table selection section 43.

[0038] Drawing 9 is what graph-izes the drive pattern of the actuator 14 memorized by ROM44, and illustrates it. The pattern with which drawing 9 (a) carries out the load of the vibration of the fixed mode to the manual operation section irrespective of the rotation of the manual operation section 3, The pattern with which the rotation of the manual operation section 3 increases drawing 9 (b) and which is alike, therefore carries out the load of the shocking vibration to the manual operation section periodically, The pattern with which the rotation of the manual operation section 3 increases drawing 9 (c) and which is alike, therefore carries out the load of the vibration of other modes to the manual operation section periodically, The pattern with which drawing 9 (d) carries out the load of the external force of the pin center, large return direction to the manual operation section 3, and drawing 9 (e) are patterns which carry out the load of the big feeling of resistance to the manual operation

section, when it becomes the amount as which the rotation of the manual operation section 3 was determined beforehand. Since the feeling of resistance accompanying rotation operation is given to the manual operation section 3 when the pattern of drawing 9 (a) is chosen, fine operation of the manual operation section 3 becomes easy. Whenever each radio station aligns when tuning in the radio station which showed drawing 7 (a), for example since a periodic feeling of a click is given to the manual operation section 3 when the pattern of drawing 9 (b) or drawing 9 (c) is chosen, a channel selection of a radio station can be easy-ized by the load of the external force being made to be carried out to the manual operation section 3. Moreover, since the manual operation section 3 can be automatically returned to a pin center, large position when the pattern of drawing 9 (d) is chosen, temperature control of the air-conditioner shown, for example in drawing 7 (b) can be easy-ized. Furthermore, when the pattern of drawing 9 (e) is chosen, an operator can be made to do learning of the operation limitation of the manual operation section 3.

[0039] Hereafter, the control procedure of the actuator 14 by the computer is explained based on drawing 10 , referring to drawing 8 .

[0040] If an operator presses the push button switches 4a-4f, or 5a-5c, a switch signal will be outputted from the pressed push button switch, and the electrical machinery and apparatus corresponding to the switch signal concerned will be chosen (Procedure S1). The position signal detecting element 46 incorporates the switch signal outputted from the pressed push button switch, and displays the selected electrical machinery and apparatus on the display screen D (Procedure S2). If an operator does rocking operation of the manual operation section 3 from this state (Procedure S3), the signal according to the amount of rocking and the rocking direction of the manual operation section 3 will be outputted from the stick controller 29 (procedure S4). The collating section 42 collates the output signal from the stick controller 29 with the reference value for collating, and decides the rocking actuated valve position of the manual operation section 3 (Procedure S5). It outputs a pattern selection signal to the pattern selection section 43 while the position signal detecting element 46 incorporates the output signal from the stick controller 29, chooses the function of the electrical machinery and apparatus according to the rocking actuated valve position of the manual operation section 3 and displays the selected function concerned on the display screen D (Procedure S6). The pattern selection section 43 is two or more patterns 45a, 45b, and 45c which incorporated the pattern selection signal and were memorized by ROM44... The pattern corresponding to a pattern selection signal is chosen from inside (Procedure S7). If an operator does rotation operation of the manual operation section 3 from this state (Procedure S8), the signal according to the rotation and hand of cut of the manual operation section 3 will be outputted from an encoder 25 (procedure S9). The collating section 42 collates the output signal from an encoder 25 with the reference value for collating, and decides the rotation actuated valve position of the manual operation section 3 (Procedure S10). The position signal detecting element 46 incorporates the output signal from an encoder 25, and displays the adjustment state of a function on the display screen D (Procedure S11). The collating section 42 decides the output value of an actuator 14 from the pattern chosen in Procedure S7, and the rotation actuated valve position of the manual operation section 3 decided in Procedure S10 (Procedure S12). Subsequently, the output value decided in Procedure S12 from the driver 47 is outputted, and an actuator 14 is driven (Procedure S13). The manual operation section 3 drives with an actuator 14, and the external force from an actuator 14 is transmitted to an operator through the manual operation section 3 by this (Procedure S14). Hereafter, the procedure of S1 or S14 is repeated.

[0041] ** -- like, since the manual input unit 1 of this example carries out the load of the predetermined external force to the manual operation section 3 with rotation operation of the manual operation section 3, an operator can know the content of operation of the manual operation section 3 by blind touch, and it can make operability of the manual operation section 3 good

[0042] Moreover, the selected function can be adjusted by rotating the manual operation section 3 around driving shaft 14a. When the manual operation section 3 is rotated around driving shaft 14a, the turning effort Namely, driving shaft 14a, It is transmitted to code board 25b through pulley 26, belt 27, and pulley 25d. Since code board 25b rotates to the hand of cut of the manual operation section 3 and the position signal corresponding to the hand of cut and rotation of the manual operation section 3 is outputted from carrier light-emitting-device 25a of an encoder 25 By downloading this position signal to a computer, necessary functional adjustment can be performed according to the procedure of drawing 10 .

[0043] For example, when the manual operation section 3 tends to be operated and it is going to change the setting temperature of an air-conditioner, although the change of setting temperature is gently performed when the control input (rotation) of the manual operation section 3 is small, if the control input (rotation) of the manual operation section 3 is enlarged, the change of setting temperature will be performed at high speed. For this reason, if there is no feeling of resistance in operation of the manual operation section 3 in any way, the control input (rotation) of the manual operation section 3 tends to become large, it will become difficult to perform the minor change of setting temperature correctly and quickly, and operability will become bad. Then, when the control input (rotation) of the manual operation section 3 becomes to some extent large, an actuator 14 is driven and the load of the feeling of resistance is carried out to the manual operation section 3. Since it can know sensuously that a user's control input (rotation) of the manual operation section 3 will be too large, and setting temperature of an air-conditioner cannot be finely tuned by this, setting temperature of an air-conditioner can be finely tuned correctly and quickly by making small the control input (rotation) of the manual operation section 3. In addition, it can replace with the composition which gives a feeling of resistance to operation of the manual operation section 3 in the stage to which the control input (rotation) of the manual operation section 3 became to some extent large, and it can also constitute so that a different feeling of resistance may be given to the manual operation section 3 one by one according to the control input (rotation) of the manual operation section 3. Moreover, although the above-mentioned explanation explained

taking the case of the case which increases the control input (rotation) of the manual operation section 3 where it is alike, therefore adjustment speed, such as setting temperature of an air-conditioner, increases, for example, when [which the operating speed of the manual operation section 3 increases] it is alike, therefore adjustment speed increases, a feeling of resistance can also be given to the manual operation section 3 by the same method.

[0044] Moreover, when push button switch 5a is operated and the attitude control of the input unit 1 for mount, for example, the height adjustment of a handle, is chosen, it sets. If the manual operation section 3 can be operated with the same feeling of resistance regardless of the movable range from the present handle height to the movable end of a handle, since a user cannot grasp the movable range of a mounted electrical machinery and apparatus The movable range to the movable end of the direction which it is going to adjust from the setting height of the present handle is large. The case where the control input (rotation) of the manual operation section 3 is enlarged, and handle height can be quickly moved to target height, When the movable range is small, makes small the control input (rotation) of the manual operation section 3 contrary to this and it must be made for a handle not to have to collide with the movable end Such suitable operation cannot be performed but it is easy to start un-arranging [that the height adjustment of a handle takes a long time, or a handle collides with the movable end at high speed, and a shock occurs]. Then, if the movable range of a handle is computed by mounted computer and it is made to carry out the load of the feeling of resistance according to the size of the movable range to the manual operation section 3 with an actuator 14, since a user can realize the movable range of a handle at the time of operation of the manual operation section 3, he can operate the suitable manual operation section 3 according to the movable range, and can cancel above un-arranging. In addition, calculation of the movable range can attach position sensors, such as an encoder, to the actuator for performing attitude control of the input unit 1 for mount, and can be performed by downloading to a computer the position signal outputted from the position sensor concerned.

[0045] Furthermore, the user of a manual input unit 1 has a strong person and a person with the weak force. Therefore, if the operating physical force (feeling of resistance) of the manual operation section 3 is fixed, for a strong user, operation of the manual operation section 3 is too light, fine tuning of the input unit 1 for mount is difficult, and for a user with the force weak on the contrary, operation of the manual operation section 3 will be too heavy, and will produce the case where large adjustment of the input unit 1 for mount is difficult. Then, if the operating physical force applied to the manual operation section 3 by mounted computer is computed and it is made to carry out the load of the feeling of resistance according to the size of an operating physical force to the manual operation section 3 with an actuator 14, since the optimal feeling of resistance for each user can be given, a feeling of operation good also to a user with the weak force can also be given to a strong user. In addition, calculation of the operating physical force applied to the manual operation section 3 can download to a computer the position signal outputted from an encoder 25, and can be performed by calculating the acceleration of change of a position signal.

[0046] In addition, it is possible it not only to give a feeling of resistance to the manual operation section 3, but to apply external force to the sense to which the manual operation section 3 is moved. For example, when moving the manual operation section 3 in the direction downed in volume on the contrary so that a feeling of resistance may be sensed, when adjusting the volume of the radio mentioned later or a CD player and moving the manual operation section 3 in the direction which raises volume, the load of the external force can be carried out to the manual operation section 3 so that a feeling of acceleration may be sensed. Since volume can be promptly extracted to down volume while being able to cancel un-arranging [that the sound which comes out to the vehicle interior of a room becomes large suddenly] in case volume is raised if it does in this way, it is cancelable un-arranging [that conversation is prevented from listening or the conversation of an audio].

[0047] These control of each can also be performed by memorizing beforehand necessary pattern data which are illustrated to ROM44 with which the computer was equipped at drawing 9 and drawing 10 .

[0048] In addition, two or more patterns with which the output values of an actuator 14 differ are beforehand memorized to the computer about each contents of operation of each electrical machinery and apparatus, and the pattern suitably used for control of an actuator 14 can be switched according to liking of a user. The change of a pattern can equip for example, the manual operation section or its near portion with the switch for a pattern change (illustration abbreviation), and when a user operates the switch concerned suitably, it can be performed. Moreover, a computer recognizes each user's ID and can switch a pattern automatically. If it does in this way, since the feeling of resistance which acts on the manual operation section according to liking of a user can be changed suitably, operability of the manual operation section can be made better.

[0049]

[Effect of the Invention] While according to this invention attaching an actuator in a frame free [rocking] and detecting the rocking direction and the amount of rocking of the actuator concerned in the 1st position sensor Since the hand of cut and rotation of a driving shaft of the actuator concerned are detected in the 2nd position sensor For example, by being made to perform functional adjustment of the mounted electrical machinery and apparatus which chose the mounted electrical machinery and apparatus which is going to carry out functional adjustment by switching the rocking direction of an actuator, and was chosen according to the rotation of a driving shaft Selection and functional adjustment of a request of a mounted electrical machinery and apparatus can be performed in the one manual operation section. Moreover, since the manual operation section is attached in the driving shaft of an actuator and it was made to carry out the load of the external force according to the contents of operation to the manual operation section A user can be notified of the contents of operation of the manual operation section by blind touch. a user Since the manual operation section can know sensuously whether it is operated at the rate of the request of only the control input of a request in the direction of desired, the operation mistake of the manual operation

section is prevented and operability of a manual input unit can be made good. Moreover, since the manual operation section was attached in the driving shaft of an actuator, the power transmission device which connects the manual operation section and a driving shaft becomes unnecessary, and a miniaturization and lightweight-izing of a manual input unit can be attained. Furthermore, since it has only one actuator, a miniaturization and lightweight-izing of a manual input unit can be attained also from this point.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram showing the installation state to the dashboard of the input unit for mount concerning the example of an operation gestalt.

[Drawing 2] It is the plan showing the indoor state of an automobile where the input unit for mount concerning the example of an operation gestalt was attached.

[Drawing 3] It is the cross section of the mechanism section containing the manual operation section.

[Drawing 4] It is a plan for the guide plate with which the mechanism section is equipped, and the periphery.

[Drawing 5] It is the plan showing an example of the connection structure of the main shaft of an actuator and the code board axis of rotation with which the mechanism section is equipped.

[Drawing 6] It is explanatory drawing which illustrates the operation direction of the manual operation section concerning the example of an operation gestalt, and the classification of the mounted electrical machinery and apparatus chosen by it.

[Drawing 7] It is explanatory drawing which illustrates the operation direction of the manual operation section concerning the example of an operation gestalt, and the classification of the function switched by it.

[Drawing 8] It is the block diagram showing the control system of the actuator concerning the example of an operation gestalt.

[Drawing 9] It is the graphical representation which illustrates the pattern of the external force by which a load is carried out to the manual operation section concerning the example of an operation gestalt.

[Drawing 10] It is the flow chart which shows the control procedure of the actuator concerning the example of an operation gestalt.

[Drawing 11] It is the inside view of the automobile in which the example of installation of the input unit for mount concerning the conventional example is shown.

[Drawing 12] It is the side elevation of the input unit for mount by which the conventional proposal is made.

[Drawing 13] It is the plan of the manual operation section of the input unit for mount shown in drawing 12.

[Drawing 14] It is the plan of the guide plate included in the input unit for mount shown in drawing 12.

[Description of Notations]

1 Input Unit for Mount
2 Case
3 Manual Operation Section
4a, 4b, 4c, 4d, 4e, 4f Push button switch
5a, 5b, 5c Push button switch
6 Volume Tongue
7 Card Slot
8 Disk Slot
11 Mechanism Section
14 Actuator
14a Driving shaft
25 Encoder (2nd Position Sensor)
29 Stick Controller (1st Position Sensor)
41 CPU
42 Collating Section
43 Table Selection Section
44 ROM
45a, 45b, 45c Table
46 Position Signal Detecting Element